bodies of water range from mere tarns up to 148 hectares in area; only two of them exceed 100 hectares, while five exceed 50 hectares. The shores usually consist of gravel and boulders.

One lake is 102 meters deep and 28 are more than 30 meters deep; most of them range from 1.8 meters to 30 meters in depth. Some of the lakes are fed by glacial waters and the detritus therein gives the lake water a milky appearance. A few have dark-colored water, but most of them are green or blue-green to blue in color.

The summers are short but rather warm at this altitude; in the deeper lakes the temperature of the surface water ranges from 10° to 14°, or even 20° C. in summer, while the bottom temperatures are 3.8° to 5.6° C. In some of the more elevated lakes the surface temperature is as low as 1.5° to 4° in August. As a result of the severe climatic conditions at this altitude the various bodies of water are covered with ice from 150 to 270 days each year; a few of them may be frozen for 300 days or even the entire year at certain times. The thickness of the ice varies from 49 to 87 centimeters.

The waters of these lakes hold a relatively small amount of salts in solution so that the dry residue is small, ranging from 0.4 to 30 milligrams per liter. In general, calcium is the chief mineral constituent. The water contains an abundance of dissolved oxygen, but the amount is below the saturation-point in all cases.

Very few large aquatic plants are found in these lakes because the growing season is short and the temperature is low; also the bottom is unfavorable for attached plants because it consists of gravel and boulders. Several of the green algae, such as Spirogyra, Zygnema, etc., are found more or less abundantly in some of the lakes. The low temperature of the water and the small amount of salts are unfavorable factors for the phytoplankton; diatoms seem to withstand these conditions much better than the green algae. Peridinians and flagellates are found to a limited extent in the summer.

Animal forms are represented by amphibians, fishes, mollusks, insects, crustacea, rotifers, worms and protozoa. The biology, ecology and origin of the fauna are discussed at some length. The bibliography contains a list of 142 titles.

CHANCEY JUDAY
WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY

Antarctic Adventure and Research. By GRIFFITH TAYLOR. Appleton (New World of Science Series), 1930. 245 pp., 34 figs. $2.00.

THE appearance of this little book from the pen of Captain Scott's senior geologist on his last expedition, now holding the chair of geography at the University of Chicago, is most opportune when so many are stimulated to inquiry into Antarctic conditions. It might well be doubted if there is any one to-day better fitted to treat of this broad subject. Professor Taylor's background is well displayed in his summary of Antarctic exploration which occupies the first eighty-two pages of the book. The *raison d'être* of each expedition, the importance which it assumes and the results which were achieved are all treated with a thorough grasp of the subject and with a brevity which is masterly. The delicate international questions which have sometimes been involved are dealt with fully and fairly.

The remaining chapters of the book are devoted to "The Continent, its Geology and Relation to Other Lands," "Scenery and Topography," "Ice-sheets and Glaciers," "Oceanography and Sea Ice," "Climatology," "Flora and Fauna" and "Commercial and Political Aspects." The more important reference works for each chapter are cited and evaluated, and the book has a good index. The thirty-four text illustrations, though a little crude and sketchy in character, are none the less very helpful in the exposition of the subject. A surprising amount of accurate and well-arranged scientific material has been compressed into this little book, though the interest is kept up to the end. It is to-day the best book on the subject which it treats.

WM. H. HOBBS
UNIVERSITY OF MICHIGAN

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN IMPROVED COLOR STANDARD FOR THE COLORIMETRIC DETERMINATION OF CHLOROPHYLL[1]

A RAPID and accurate method of measuring quantities of chlorophyll in plant extracts reported previously[2] included the use of an appropriate color standard and a colorimeter. The color standard was prepared by mixing stock solutions of the dyes, Malachite Green and Naphthol Yellow, in such proportions that the tint was practically identical with that of solutions of saponified chlorophyll. Evaluation of the color standard in terms of known concentrations of chlorophyll made it possible to determine the chlorophyll content of certain strains of corn in a convenient manner.[3] The procedure outlined offers

[1] Paper of the Journal Series, New Jersey Agricultural Experiment Station, Department of Agronomy.

[2] Howard B. Sprague, "A Convenient Method of Measuring Quantities of Chloroplast Pigments," SCIENCE, 67: 167–169, 1928.

[3] Howard B. Sprague and J. W. Shive, "A Study of the Relations between Chloroplast Pigments and Dry Weight of Tops in Dent Corn," *Plant Physiology*, 4: 165–192, 1929.

a new approach to the important problem of determining the relation between quantities of chloroplast pigments and plant growth.

In making use of the method for studies concerning the nutritive value and chlorophyll content of plant tissue, the second author of this note found it desirable to modify the color standard by changing the relative proportions of the two dyes. The modified color standard is more satisfactory for general work than the one described previously, since it produces a more perfect match in color with chlorophyll extracts of various plants. It is prepared as follows.

Nine tenths cc of a ½ per cent. aqueous solution of Malachite Green and 11.2 cc of a ½ per cent. aqueous solution of Naphthol Yellow are made up to 5,500 cc with distilled water. The concentration of color in this standard is the equivalent of that produced by 11.873 milligrams of chlorophyll saponified to chlorophyllins and diluted with water to make one liter.

Several investigators have called attention (in personal correspondence) to the variability in different lots of Malachite Green and Naphthol Yellow which may be purchased. Because of this situation, lots of dyes from a number of sources have been compared with the original dyes[3] used in preparing the standard. The following lots of Malachite Green were apparently identical with the original lot: (1) *Malachite Green Crystals,* 1264, Research Laboratory, Eastman Kodak Company; (2) *Malachite Green Crystals,* the Coleman and Bell Company; (3) *Malachite Green,* for histological use, Schultz No. 495, C. I. 657, National Aniline and Chemical Company, "Found satisfactory by commission on standardization of biological stains for above-mentioned purposes."

Malachite Green 0926, Dr. Grübler and Company, Leipzig, Germany, was identical in color but more concentrated than the original lot of dye. *Malachite Green Hydrochloride,* the Coleman and Bell Company, proved unsuitable for this purpose.

The several lots of Naphthol Yellow tested were identical in tint with the standard lot of this dye, but all required filtering except the Martiusgelb of Grübler. One half per cent. aqueous solutions of each lot of dye tested were made with distilled water and allowed to stand for several hours until maximum solution at room temperature was obtained, and then filtered with No. 42 Whatman filter-paper. With this treatment, the following lots of dye gave filtrates identical in color and concentration with the standard lot of Naphthol Yellow: (1) *Naphthol Yellow S,* National Medicinal Products, National Aniline and Chemical Company; (2) the same label as No. 1 but distributed by the Eastman Kodak Company; (3) *Naphthol Yellow,* E & A Biological Stains, B 119, Eimer and Amend.

The *Martiusgelb* of the Dr. Grübler and Company proved less concentrated than the original dye, likewise the *Martius Yellow* (Naphthol Yellow) Schultz No. 6, C. I. 9 of the National Aniline and Chemical Company. The latter dye bears the additional statement, "Found satisfactory by commission on standardization of biological stains, for use in histology, especially the Pianese triple stain." The *Naphthol Yellow* sold by the Fisher Scientific Company was more concentrated than the original standard dye.

It is suggested that workers expecting to make use of the chlorophyll color standard described in the foregoing in any extensive investigations purchase a considerable quantity of the satisfactory lots of dye.

HOWARD B. SPRAGUE
LINDSAY B. TROXLER

COLLEGE OF AGRICULTURE,
RUTGERS UNIVERSITY

A STORAGE TUBE FOR PLASMA AND EMBRYO JUICE

IN cultivating mammalian tissues *in vitro* the problem of containers for the storage of embryo juice and plasma is often a vexing one since it is difficult to insure effective cooling and sterility and at the same time to facilitate the handling of these substances. In our laboratory we have devised a double-necked tube which has proved very efficient and which may be of interest to others engaged in similar problems, as it avoids these difficulties. The single tube in common use is very subject to infection in the ice pack, and the constant flaming besides being a nuisance hastens clotting. The double tube described by Strangeways, while insuring sterility, is difficult to cool and in operation has the same objections as the single tube. To overcome these difficulties we prepared a tube with a double neck fashioned in such a manner that the outer neck was somewhat longer than the inner one in order that each could be plugged independently. The lower end of the tube being of a single thickness is in direct contact with the ice and insures cooling. The opening of the outer neck is plugged with cotton which may be removed by the fingers. The inner neck-opening is plugged with a sterile cork and can be removed with sterile forceps. This double protection has many advantages that facilitate operation.

Used in place of the usual tube in centrifuging the rat plasma, the double plug insures sterility without flaming and removes the risk of raising the temperature and hastening clotting.

In the operation of mounting the cultures the containers for the embryo juice and the plasma must be opened many times. This operation necessitates flam-